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16. Abstracts

The report is a compilation of all nitrate criteria limitations within state-adopted water quality standards. Nitrate standards are set to control the amount of nitrates discharges into the water. Nitrates and phosphates in wastes contribute to excess amounts of nutrients in our water. Artificially nutrient-enriched waters are over fertilized, altering aquatic systems. Quite often algae blooms occur in lakes and slow-moving steams. Certain algae can make public water supplies and fish flesh unpalatable. Aquatic growths stimulated by nutrients can trap silt and organic matter, providing ideal breeding spots for bacteria, and can choke up steams. Such growths can reduce the oxygen concentrations in the water, killing fish and greatly reducing the steam's ability to purify itself. Organic enrichment is a primary factor in overaging or eutrophication, the process causing the "death" of Lake Erie.

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Office of Water Programs

Nitrates

Division of Water Quality Standards
Washington, D. C.
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INTRODUCTION

This is a compilation of all nitrate criteria limitations within State-adopted water quality standards.

The Federal water quality standards program is directed by the Environmental Protection Agency, an independent regulatory agency which has responsibility for approving State-adopted standards, evaluating adherence to the standards, and overseeing enforcement of standards compliance.

Standards, the first nationwide strategy for water quality management, contain four major elements: the use (recreation, drinking water, fish and wildlife propagation, industrial, or agricultural) to be made of the interstate water; criteria to protect those uses; implementation plans (for needed industrial-municipal waste treatment improvements) and enforcement plans; and an anti-degradation statement to protect existing high quality waters.

Minimum water quality criteria, or numerical specification of physical, chemical, temperature, and biological levels, are stated in the National Technical Advisory Committee report to the Secretary of the Interior, Water Quality Criteria, dated April 1, 1968, and published by the Government Printing Office, Washington, D. C. Unavailability of the NTAC report before June 30, 1967--the date set by the Water Quality Act of 1965 for formal adoption of State standards--resulted in significant variations between the State-adopted and the NTAC minimum criteria. Some standards were adopted and approved before the NTAC report became available.

Nitrate standards are set to control the amount of nitrates discharges into the water. Nitrates and phosphates in wastes contribute to excess amounts of nutrients in our water. Artificially nutrient-enriched waters are over fertilized, altering aquatic systems. Quite often algae blooms occur in lakes and slow-moving streams. Certain algae can make public water supplies and fish flesh unpalatable. Aquatic growths stimulated by nutrients can trap silt and organic matter, providing ideal breeding spots for bacteria, and can choke up streams. Such growths can reduce the oxygen concentrations in the water, killing fish and greatly reducing the stream's ability to purify itself. Organic enrichment is a primary factor in overaging or eutrophication, the process causing the "death" of Lake Erie.

The National Technical Advisory Committee in Water Quality Criteria did not make specific fixed recommendations limiting nutrients. However, nitrates were limited as follows: "The naturally occurring ratios and amounts of nitrogen (particularly NO_3 and NH_4) to total phosphorus should not be radically changed "by artificial means. They recommended that phosphate levels in flowing streams should not exceed "100 ug/l or more than 50 ug/l where streams enter lakes or reservoirs."

The Water Quality Criteria report is presently being updated in light of new scientific and technical information, with scheduled publication in June 1972. These criteria compilations are issued to provide information to the public on water quality standards. As further information becomes available, they will be updated.

Water quality standards are subject to change when justified by newly available technical and scientific information . For the latest information refer to the existing approved water quality standards which can be obtained from the individual State water pollution control agency or EPA regional office.

Individual State-adopted standards follow.

Alabama	There are no specific criteria or narrative statements limiting nitrate or any other nutrient in the aquatic environment.
Alaska	There is no specific criteria and no narrative statement directed at the limitation of such nutrients as nitrate. Unless the toxic material standards or the taste and odor standards could be applied to nitrate problems there is only one other possibility. That is the following Policy Statement of the State of Alaska: Alaska Statutes Title 46, Chapter 05, Section 46, 05, 010: "It is the public policy of the state to maintain reasonable standards of purity of the waters of the state consistent with public health and public enjoyment, the propagation and protection of fish and wildlife, including birds, mammals and other terrestrial and aquatic life, and the industrial development of the state, and to require the use of all known available and reasonable methods to prevent and control the pollution of the waters of the state."
Arizona	Policy statement: "Other methods and degrees of treatment will be required, as appropriate, to remove nutrients, oily constituents and other polluting materials from wastes before discharge." "All waters of the State shall be free from materials attributable to domestic or industrial waste or other controllable sources in amounts sufficient to produce taste or odor in the water or detectable off-flavor in the flesh of fish, or in amounts sufficient to change the existing color, turbidity or other conditions in the receiving stream to such degree as to create a public nuisance, or in amounts sufficient to interfere with any beneficial use of the water."
Arkansas	No nitrate statement or criteria.
California	They define "Water Quality Control as the control of any factor which adversely and unreasonably impairs the quality of the waters of the State for beneficial use. (California Water Control Act, Section 13005.) Pollution control is an important part of water quality control." Goose Lake narrative statement regarding plankton indicates that if nutrients including nitrates accumulated to the degree that they cause plankton blooms they would be subject to control. "The Total Plankton Population Shall be Maintained Below Bloom Level. This objective is designed to

California
(Cont'd)

protect fishlife and recreational use of the lake by limiting the concentration of plankton below the bloom level which is defined as that plankton concentration which causes significant nuisance conditions, or significantly affects desirable fish populations."

Sacramento-San Juan Delta Nitrogen Criteria: "Total Nitrogen Content of Delta Waters shall not exceed:

"A. 1.0 mg/l in the Central Delta."

"B. 2.0 mg/l in the Western Delta."

"C. 3.0 mg/l in the Eastern Delta."

Nitrogen content, as used in this objective is considered to be the sum of Nitrogen present in the water in all forms including Nitrate (NO^3), Nitrate (NO^2), Ammonia (NH_3 or NH_4), organically combined nitrogen.

"Materials Stimulating Algal Growth." "Materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities." "Plankton blooms are encouraged by the presence, in sufficient concentrations of several nutrient materials. Among these are nitrogen, phosphorus, silica, vitamins, iron and other metals and dissolved salts."

Tidal Waters Inland From the Golden Gate Within The San Francisco Bay Region: "Total nitrogen concentration shall not exceed 2.0 mg/l as nitrogen at any point within the Region easterly of Carquinez Strait; in no case shall nutrients be present in concentrations sufficient to cause deleterious or abnormal biotic growths except when factors which are not controllable cause greated concentrations (Note A)."

West Fork Carson River: "Nitrates: A mean annual concentration less than 2.0 mg/l, and a maximum concentration not to exceed 3.0 mg/l at any time."

Truckee River: "Nitrates: A mean annual concentration less than 1.0 mg/l, and a maximum concentration not to exceed 2.5 mg/l at any time."

California (Cont'd)

East Fork Carson River: "Nitrates: A mean annual concentration less than 1.5 mg/l, and a maximum concentration not to exceed 2.0 mg/l at any time."

West Walker River and Lake Topaz: "Nitrates: A mean annual concentration less than 1.5 mg/l, and a maximum concentration not to exceed 2.0 mg/l at any time."

East Walker River: "Nitrates: A mean annual concentration less than 3.0 mg/l, and a maximum concentration not to exceed 4.5 mg/l at any time."

New River: No narrative statement or specific criteria concerning nitrates.

Colorado River in California: The only statement that might be applicable to nitrate problems is: "The waters shall be free from materials attributable to domestic or industrial waste or other controllable sources, which may produce taste or odor in the water or detectable off-flavor in the flesh of fish, that may alter the water's existing color or turbidity, or that may adversely affect other conditions in the river." "Allowable limits of annual average of analyses under the surveillance schedule for Nitrate is 5.0 mg/l and for Ammonia (NH_3) 1.0 mg/l."

Lake Tahoe: "Total Soluble Nitrogen: A mean annual concentration of the sum of soluble nitrate-N, nitrate-N, and ammonia-N not greater than 24 micrograms N per liter at any point in the lake."

A plankton count criteria related to nutrients including nitrates is included: "Plankton Count: A mean seasonal concentration not greater than 100 per milliliter and a maximum concentration not greater than 500 per milliliter at any point in the lake."

Another plankton standard related to nutrients is: "Plankton Growth Potential: A mean annual growth potential at any point in the lake not greater than twice the mean annual growth potential at the limnetic reference station."
They have stringent narrative statements on foreign materials and taste and odor which would include nitrates and other nutrients.

"1. Foreign Material: None which impairs the natural beauty, clarity, or purity of the lake."

"2. Taste and Odor Causing Substances: None which imparts foreign taste or odor to the lake waters."

California (Cont'd)

Coastal Waters, Point Pedras Blancas to Pecadero Point: Nitrates and other nutrients are not covered by these standards.

Coastal Waters, Rincon Point to Point Arguello: Nitrates and other nutrients are not covered by these standards.

Coastal Waters, Point Arguello to Point Piedras Blancas: Nitrates and other nutrients are not covered by these standards.

Pacific Ocean Pescadero Point to Mouth of Tomales Bay, Bolinas Lagoon, Drakes Estero, Limatour, Estero, Portions of Tomales Bay and tidal portions of coastal streams: Nutrients which include nitrates and others are covered by the following narrative statement: "None in concentrations sufficient to cause deleterious or abnormal biotic growths except when factors which are not controllable cause greater concentrations."

Humboldt-Del Norte Coastal Waters: The following narrative statement on Toxic or other Deleterious substances applies to nitrates, and other nutrients: "Toxic or Other Deleterious Substances: There shall be no organic or inorganic substances in concentrations.....which cause deleterious growths of algae or other plant life."

Pacific Ocean Coastal Waters, Rincon Point to San Gabriel River: The only standard that might be applicable is the following narrative statement: "Other Materials: Other materials shall not be present in concentrations that would be deleterious to fish, plant or aquatic wildlife."

Mendocino Coast: The following narrative statement applies to nitrates, and other nutrients: "Toxic or Other Deleterious substances: There shall be no organic or inorganic substances in concentrations which are toxic or detrimental to human, animal, plant, or aquatic life, which impart undesirable tastes or odors to species of commercial or sport importances, or which cause deleterious growths of algae or other plant life."

Pacific Ocean San Gabriel River to Drainage Divide Between Muddy Canyon and Moro Canyon: Under objective rationale they state: "Nutrients:.....The research to date has not been able to develop satisfactory criteria for nutrient levels in open sea water that will not over-stimulate

California (Cont'd)

plankton production. Thus, a standard for nutrients is omitted until a basis for such can be found."

Humbolt Bay: The following narrative statement covers all the nutrients including nitrates: "There shall be no organic or inorganic substances in concentrations....which cause deleterious growths of algae or other plant life."

Sonoma - Marin Coast: The following narrative statement covers all the nutrients including nitrates. "There shall be no organic or inorganic substances in concentrations.... which cause deleterious growths of algae or other plant life."

San Diego Bay: The following narrative statement applies to all nutrients including nitrates. "Nutrient levels shall be limited to those levels necessary to minimize phytoplankton blooms, thus preventing unsightliness, turbidity, color, and oxygen depression."

Harbors, Marinas and Tidal Prisms in Los Angeles and Ventura Countries: The following narrative statement applies to all nutrients including nitrates: "Nutrients: Nutrients of other than natural origin shall not be present in concentrations capable of causing proliferation of plankton or other undesirable biotic growths."

Klamath River in California: The following narrative statement applies to all nutrients including nitrates: "Concentrations of dissolved nutrients shall be maintained at levels below those which may cause undesirable algae blooms, slime or bacterial growth, or other undersirable biological growths."

Tijuana River Basin in California: "Concentrations of nitrates and phosphates of waste origin, by themselves or in combination with naturally occurring nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth."

Smith River: The following narrative statement covers all nutrients including nitrates: "There shall be no organic or inorganic substances in concentrations..... which cause undesirable algae blooms, slime or bacterial growth, or other undesirable biolofical growths."

Mission Bay Including Tidal Prism of San Diego River and Agua Hedionda Lagoon: "Nutrients: Concentrations of nitrates and phosphates of waste origin, by themselves

California (Cont'd)	or in combination with naturally occurring nurtirents, shall be maintained at levels below those which stimulate algae and emergent plant growth." San Gabriel River Tidal Prism: "Nutrients, of other than natural origin, shall not be present in concentrations capable of causing proliferation of undesirable biotic growths." Coastal Bays, Marinas and Sloughs Between the San Gabriel River and the Drainabe Divide Between Muddy Canyon and Moro Canyon: "Nutrients: Nutrients (nitrogen, silicate, and phosphate shall not be present except from natural conditions, in amounts that will cause de`eterious or abnormal growths to occur on the substrate or to foster biotic growths that are harmful to beneficial uses."
Colorado	There are no specific criteria for any of the nutrients. The narrative statement concerning toxic materials might restrict nitrates at levels below where damage to aquatic life occurred. This statement is as follows: "Toxic material: Free from biocides, toxic or other deleterious substances attributable to municipal, domestic, or industrial wastes, or other controllable sources in levels, concentrations or combinations sufficient to be harmful to aquatic life."
Connecticut	The narrative statements concerning taste and odor and chemical constituents are the only standards that could apply to nitrates. "Taste and Odor:" For water supply: "None in such concentrations that would impair any usages specifically assigned to this Class nor cause taste and odor in edible fish." Class D: "None in such concentrations that would impair any usages specifically assigned to this class." For coastal and marine waters: Class A: "None allowable." Class SB, SC, SD: "None in such concentrations that would impair any usages specifically assigned to this Class and none that would cause taste and odor in edible fish or shellfish." Chemical Constitutents (freshwater): Class A, B, C, and D. "Waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life for the appropriate, most sensitive and governing considerations and approved limits have not been established, bioassay shall be performed as required by the appropriate agencies. For public drinking water supplies the raw water sources must be of such a

Connecticut (Cont'd)	quality that United States Public Health Service limits, or State limits if more stringent, for finished water can be met after conventional water treatment." Chemical Constituents (coastal and marine): Class SA: "None in concentrations or combinations which would be harmful to human, animal, or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the waters for any other use." "Class SB, SC, and SD: None in concentrations or combinations which would be harmful to human, animal, or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, or impair the water for any other usage assigned to this Class."
Delaware	The following declaration of policy in 6301, Chapter 63, Water Pollution, Title 7, Part VII, Delaware Code is "(a) It is declared to be the public policy of the State to maintain within its jurisdiction a reasonable quality of water consistent with public health and public enjoyment thereof, the propagation and protection of fish and wildlife, including birds, mammals, and other terrestrial and aquatic life, and the industrial development of the State. (b) It is the purpose of this chapter to safegard the quality of state waters against pollution by (1) preventing new pollution in such waters and (2) controlling any existing pollution." The adopted standards approved by the Secretary with certain exceptions and recommendations that could apply to nitrates are those concerned with toxic substances and taste, odor, and color causing substances: "Toxic Substances: None in concentrations harmful (synergistically or otherwise) to humans, fish, shellfish, wildlife, and aquatic life.
Florida	There are no specific criteria for nutrients such as nitrates and no narrative statement directly applicable to nutrients such as nitrates. The only item in the water standards of Florida, as approved, that might be used to protect that States waters from excessive amounts of phosphates and there accompanying problems would be the antidegradation statement.
Georgia	There are no specific criteria for nutrients such as nitrates nor is there a narrative statement directly concerned with nitrates or other nutrients.

Hawaii

"Nutrient Materials All Waters:	Applicable to:
Total nitrogen, not greater than 0.10 mg/l.	Class AA
Total nitrogen, not greater than 0.15 mg/l.	Class A
Total nitrogen, not greater tha 0.20 mg/l.	Class B

The following revision of water quality standards regarding nutrients was submitted in a letter dated December 26, 1967, prior to approval by the Secretary from Walter B. Quisenberry, M.D. to Mr. William B. Schroeder: "Insert the following section immediately preceding the section titled "Wastes from Vessels and Marinas:"

"Control of Nutrients:

Nutrient discharges were pointed out in testimony as being a potential problem in several water areas such as Kaneohe Bay and Pearl Harbor. The Agency is cognizant of this potential problem and nutrient limits have been included in the water quality criteria. At present the Agency knows of no practicable methods for the control of nutrients. The Agency will devise and implement control measures when the means to do so become available."

Hawaii has never adopted and submitted for approval an antidegradation statement that also could be used for the protection of its high quality waters from problems due to excessive nutrients such as nitrates.

Idaho

Under the section titled "GENERAL WATER QUALITY STANDARDS FOR INTERSTATE STREAMS" is the narrative statement: "Interstate waters shall not contain.....Excess nutrients of other than natural origin that cause visible slime growths or other nuisance aquatic growths."

There is no specific criteria for nutrients such as nitrates and Idaho does have an approved antidegradation statement to protect existing high quality waters from excessive amounts of nutrients such as nitrates.

Illinois

The water quality standards for the Interstate Waters, Wabash River and Tributary Streams Crossing into Indiana, Interstate Waters Mississippi River Between Illinois and Missouri, Interstate Waters Ohio River and Saline River, and the Interstate Waters Mississippi River Common Boundary Between Illinois and Iowa do not include specific criteria or a narrative statement directly concerned with limits for nitrates and other nutrients. Specific criteria for nitrate concentrations was included in the water quality standards for the following interstate waters:

1. Interstate Waters Illinois River and Lower Section of Des Plaines River.

   a. Public Water Supply and Food Processing: "Not to exceed 45 mg/l Nitrate (as NO_3)...2.5 mg/l Ammonia Nitrogen N.

   b. There are no specific criteria or narrative statement concerning limits for nitrates and other nutrients assigned sectors of these waters classified for Aquatic Life, Recreation, and Industrial Water Supply.

Interstate Waters Chicago River and Calumet River System and Calumet Harbor Basin:

   a. Sectors 1-3: Not to exceed....2.5 mg/l Ammonium Nitrogen (N).

   b. Sectors 4-10: Ammonium Nitrogen-mg/l.
   Annual Average not more than 0.05.
   Single daily value or average not more than 0.12.

Interstate Waters Lake Michigan and Little Calumet River, Grand Calumet River and Wolf Lake:

   a. Lake Michigan Open Water:
   Total Nitrogen (N)
   Not more than 0.4 mg/l.
   Ammonium Nitrogen (N)
   Annual average 0.02 mg/l.
   Single daily value or average 0.05 mg/l.

   b. Lake Michigan Shore Water:
   Ammonia Nitrogen (N):
   Annual average not more than 0.05 mg/l.
   Single daily value or average not more than 0.12 mg/l.

   c. Little Calumet River:
   Ammonium Nitrogen - Single daily value or average not more than 1.5 mg/l.

   d. Wolf Lake:
   Ammonia Nitrogen (N):
   Annual average not more than 0.03 mg/l.

Illinois (Cont'd)

Single daily value or average not more than 0.12 mg/l.

The following Nitrate Standards by State effluent criteria for nitrates and other nutrients has been adopted by the State as part of their standards.

Nitrate (NO_3): Not to exceed 45.0 mg/l.
Ammonia Nitrogen (N): Not to exceed 2.5 mg/l.

The State has an approved antidegradation statement that could be used to protect existing high quality waters from excessive nitrate concentrations causing problems.

Indiana

There are no specific criteria or narrative statement limiting nitrates or other nutrient substances in the Indiana water quality standards for any of the interstate basins other than Lake Michigan drainages unless the antidegradation statement could be applied for existing high quality waters.

Nitrate criteria applicable to Lake Michigan Basins.

Lake Michigan Open Waters:
Total Nitrogen (N) mg/l 0.4

Lake Michigan Shore Waters:
Ammonia Nitrogen (N) - mg/l
Annual average not more than 0.05.
Single daily value or average not more than 0.12.

Indian Harbor Canal:
Ammonia Nitrogen (N) - mg/l
Annual average not more than 1.0.
Single daily value or average not more than 1.5.

Grand Calumet River:
Ammonia Nitrogen (N) - mg/l
Single value not more than 5.0.

Little Calumet River:
Single daily value or average not more than 1.5.

Wolf Lake:
Ammonia Nitrogen (N) - mg/l
Annual average not more than 0.05.
Single daily value or average not more than 0.12.

Iowa

The following narrative statement could in my opinion be used to limit the amount of nitrates and other nutrients in the aquatic environment.

1. Public Water Supply

All substances detrimental to treatment processes shall be limited to non-detrimental concentrations in the surface waters.

2. Aquatic Life

All substances detrimental to aquatic life shall be limited to non-detrimental concentrations in the surface waters.

Specific criteria for interstate waters classified for Aquatic Life:

1. Ammonia Nitrogen (N) mg/l not more than 2.0.

They have approved antidegradation statement that could be used to protect existing high quality waters.

Kansas

The only standards regarding the limiting of nitrates in the aquatic environment are as follows:

1. Antidegradation statement--Existing high quality waters could be protected from damages resulting from discharge of effluents containg high nitrate concentrations to the aquatic environment.

2. The general criteria assigned to all Kansas Interstate Basins- "Pollution substances will be maintained below maximum permissible concentrations which would be detrimental for public water supplies, recreation requirements, and other established beneficial uses."

Kentucky

Interstate waters classified for livestock use:

Nitrates shall not exceed 45.0 mg/l.

Two of four freedoms narrative statements in Kentucky water quality standards could be used to limit nitrates in interstate waters. They are:

"Free from materials attributable to municipal, industrial or other discharges producing color, odor or other conditions in such degree as to create a nuisance."

"Free from substances attributable to municipal, industrial or other discharges in concentrations or combinations which are toxic or harmful to human, animal, plant or aquatic life."

Louisiana

All interstate waters of Louisiana are assigned a general criteria which could be used to protect such waters from excessive concentrations of nitrates or other nutrients. This statement with slight variations of use classification is:

"Wastes after discharge...shall not create conditions which adversely affect public health or use of the water for the following purposes: domestic or industrial water supply, propagation of aquatic life, agricultural water, recreation, and other legitimate uses."

Maine

The following narrative statements could be used to limit nitrate discharges to the interstate waters of Maine:

Class A Waters: "There shall be no discharge of sewage of other wastes into water of this classification and no deposits of such material on the banks of such waters in such a manner that transfer into the water is likely..."

Class B-1 Waters: "There shall be no disposal of sewage, industrial wastes or other wastes in such waters, except those which have received treatment for the adequate removal of waste constituents including, but not limited to, solids, color, turbidity, taste, odor or toxic material, such, that these treated wastes will not lower the standards or alter the usages of this classification, nor shall such disposal of sewage or waste be injurious to aquatic life or render such dangerous for human consumption.

Class B-2 Waters: Same as Class B-1.

Class C Waters: Same as Class B-1.

Class SA Waters: "There shall be no toxic wastes, deleterious substances, colored or other waste or heated liquids discharged to waters of this classification either singly or in combinations with other substances or wastes in such amounts or at such temperatures as to be injurious to edible or shellfish or to the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor or sanitary condition thereof; and otherwise none in sufficient amounts to make the waters unsafe or unsuitable for bathing or impair the waters for any other best usage as determined for the specific waters assigned to this class..."

Class SB-1: Same as Class SA.

Class SB-2: Same as Class SA.

Maine (Cont'd)	Class SC: Essentially the same as Class SA.
Maryland	The following narrative statement could be used to limit excessive nitrates affecting the uses of the interstate waters:
	"Materials attributable to sewage, industrial waste, or other waste which produce taste, odor, or change the existing color or other physical and chemical conditions in the receiving to such degree as to create a nuisance, or that interfere directly or indirectly with water uses..."
	The following narrative statement could be used to limit excessive nitrates affecting the uses of the interstate waters: "Materials attributable to sewage, industrial waste, or other waste which produce taste, odor, or change the existing color or other physical and chemical conditions in the receiving to such degree as to create a nuisance, or that interfere directly or indirectly with water uses;....."
Massachussetts	"Water quality parameters not specifically denoted shall not exceed the recommended limits on the most sensitive and governing water class use."
	Class A Waters: Chemical constituents: "None in concentrations or combinations which would be harmful or offensive to humans, or harmful to animal, or aquatic life."
	Class B Waters: "Ammonia as (N) not to exceed an average of 0.5 mg/1 ... during any monthly sampling period."
	Class C Waters: "Ammonia as (N) not to exceed 1.0 mg/1 ....during any monthly sampling period."
	Class D Waters: "Chemical constituents: "None in concentrations or combinations which would be harmful to human, animal, or aquatic life for the designated water use."
	Class SA Waters (Coastal and Marine): "Ammonia as (N) not to exceed an average of 0.2 mg/1....during any monthly sampling period."
	Class SB Waters: "Ammonia as (N) not to exceed an average of 0.2 mg/1....during any monthly sampling period."
	Class SC Waters: "None in concentrations or combinations which would be harmful to human, animal, or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the water for any other usage."

Michigan

Water Supply Domestic: "Nitrate (NO_3) should not exceed 45 mg/l at the intake."

Nutrients (Phosphorus, ammonia, nitrates and sugars)

"Nutrients orginating from industrial, municipal or domestic animal sources shall be limited to the extent necessary to prevent adverse effects on water treatment processes or the stimualtion of growths of algae, weeds and slimes which are or may become injurious to the designated uses."

Industrial Water Supply: Nutrients (Phorphorus, ammonia, nitrates and sugars): "Nutrients orginating from industrial, municipal or domestic animal sources shall be limited to the extent necessary to prevent the stimulation of growths of algae, weeds and slimes which are or may become injurious to the designated use."

Recreation: Nutrients (Phosphorus, ammonia, nitrates and sugars): "Nutrients orginating from industrial, municipal, or domestic animal sources shall be limited to the extent necessary to prevent the stimulation of growths of algae, weeds and slimes which are or may become injurious to the designated use."

Fish Wildlife and Other Aquatic Life: Same as for Recreation.

Agriculture: "Nutrients (Phosphorus, ammonia, nitrates and sugars): "Nutrients originating from industrial, municipal, or domestic animal sources shall be limited to the extent necessary to prevent the stimulation of growths of algae, weeds and slimes which are or may become injurious to the designated use. NO_3 concentrations shall conform to USPHS Drinking Water Standards."

Commercial Water Use: Same as Industrial Water Supply

Minnesota

Has approved antidegradation statement to protect existing high quality wates.

The following narrative statement would limit damaging amounts of nitrates: "It is the intention of the Agency to require removal of nutrients from all sources to the fullest practicable extent whenever sources of nutrients are considered to be actually or potentially inimical to preservation of enhancement of the designated water uses."

Specific criteria limiting nitrates for certain class waters is as follows:

Minnesota (Cont'd)

Domestic Consumption:

Class A (Public Water Supply): Nitrates (NO_3) 45 mg/l
None for Class B, C,& D.

Fisheries & Recreation:

Class A: Ammonia (N) Not to exceed a trace

Class B: Ammonia (N) Not more than 1 mg/l

Class C: Ammonia Not more than 2 mg/l

Industrial, Agriculture & Wildlife, and Navigation & Waste Disposal Classifications: None

Mississippi

The only direct reference to nutrients in the State's water quality standards is: "It is the plan of the Commission to work with Soil and Wastes Conservation Districts to effect control of nutrients....pollution contributed by agricultrual run off increase where this is a problem.

Does not have an approved antidegradation statement.

One of the "Freedom" statements would limit nutrients: "Free from substances atributable to municipal, industrial, agricultural or other discharge producing color, odor, or other conditions in such degree as to create a nuisance."

Missouri

This State's water quality standards include no specific criteria limiting nitrates.

One of the "Freedom" statements could be used to limit nitrates in problem areas. It is applicable to all Missouri interstate waters and states: "Substances attributable to municipal, industrial, agricultural, mining or other effluents shall not have a harmful effect on human or animal life."

These are narrative statements included in early interstate river basin standards that could be applicable in limiting nitrates. They are by River:

White River Basin- Interstate Stream Table Rock Reservoir, Bull Sholes Reservoir, Norfolk Reservoir, Clearwater Reservoir. Lake Tanecamo, North Fosk River and Spring River, Eleven Point River, Current River, & Black River (From the Headquarters to Clearwater Reservoir), Black River (Clearwater Reservoir to Mo. - Ark. State Line)

Missouri (Cont'd)

"Substances toxic to humans, fish and wildlife detrimental to agricultural, mining, industrial, recreational or other legitmate uses shall be limited to nontoxic or nondetrimental concentrations in the Stream."

Grand and Chariton River Basin - Interstate Streams

Grand and Chariton Rivers

"d. Substances Potentially Toxic or detrimental Substances toxic to humans, fish and wildlife or detrimental to agricultural, mining, industrial, recreational or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the stream."

East Fork Grand, Thompson, Little and Weldon Rivers

"d. Substances Potentially Toxic or detrimental Substances toxic to humans, fish and wildlife or detrimental to agricultural, mining, industrial, recreational or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the stream."

Mississippi - Des Moines River Basin Interstate Streams

"d. Substances Potentially Toxic or Detrimental Substances toxic to humans, fish and wildlife or detrimental to agricultural, mining, industrial, recreational or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the stream."

Osage River Basin - Interstate Streams

Osage - Marais des Cygnes River and Marmaton River

"Substances toxic to humans, fish and wildlife or detrimental to agricultural, mining, industrial, recreational or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the lake."

Lower Missouri River Basin - Interstate Streams

Nishnabotna River

"d. Substances Potentially Toxic or Detrimental Substances toxic to fish or detrimental to industrial or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the stream."

Tarkio River, West Tarkio River, Nodaway River, Platte River and One Hundered and Two River

"d. Substances toxic to humans, fish and wildlife or detrimental to agricultural, mining, industrial, recreational or other legitimate uses shall be limited to non-

toxic or non-detrimental concent rations in the stream."

Lower Mississippi River Basin - Interstate Streams

St. Francis River (Excluding Wappapello Reservoir), Wappapello Reservoir, Little River, Buffalo Ditch (St. Francis River Basin)

"d. Substances Potentially Toxic or Detrimental Substances toxic to humans, fish and wildlife or detrimental to agricultural, mining, industrial, recreational or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the stream."

Mississippi River

Mississippi River (Zone 1 - Des Moines River to Alton Lock and Dam, and Mississippi River (Zone 2 - Alton Lock and Dam to the Missouri-Arkansas State Line)

"Substances Potentially Toxic or Detrimental

d. Substances toxic to humans, fish and wildlife or detrimental or agricultural, mining, industrial, recreational, navigational, or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the stream."

Missouri River

"Substances Toxic or Detrimental

d. Substances toxic to humans, fish and wildlife or detrimental to agricultural, mining, industrial, recreational, navigational, or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the stream."

Grand (Neosho) River Basin

Spring River, Shoal Creek, Turkey Creek, Buffalo Creek, Lost Creek

"Substances Toxic or Detrimental

d. Substances toxic to humans, fish and wildlife or detrimental to agricultural, mining, industrial, recreational, navigational, or other legitimate uses shall be limited to non-toxic or non-detrimental concentrations in the stream."

Missouri (Cont'd)

Missouri has an approved antidegradation statement which could be used to protect existing high quality waters from damaging amounts of nitrates.

The requirements for Class B, C, D, D1, D2, and D3 are:

".....No excess nutrients which cause nuisance aquatic growths....."

Montana

Class A (closed) "None allowed in addition to concentrations naturally present."

Class A (open) "Concentrations of chemical constituents shall conform with the 1062 U.S. Public Health Service Drinking Water Standards. Induced variations within these standards shall be limited to an increase of not more than 10% of the concentration present in the receiving water."

Class B "Concentrations of chemical constituents shall conform with the 1962 U.S. Public Health Service Drinking Water Standards after treatment. No floating suspended dissolved or settable matter, creating nuisance conditions, not attributable to natural cause. No excess nutrients which cause nuisance aquatic growths...."

Class C "Concentrations of chemical constituents shall be maintained below levels known to be (or demonstrated to be) of Public Health Significance." ".... No excess nutrients which cause nuisance aquatic growth...."

Class D1 "Maximum allowable concentrations shall be less than acute or chronic problem levels as revealed by bio-assay or other appropriate methods. No excess nutrients which cause nuisance aquatic growths..."

Class D2 Same as D1

Class D3 Same as D1

Class E "Concentrations shall be less than those demonstrated to be deleterious to livestock or plants or their subsequent consumption by humans."

Nebraska

The following narrative statement protects waters from excessive nutrients including nitrates:

".....These waters shall be free of substances attributable to

Nebraska (Cont'd)

discharge or wastes having .....substances and conditions or combinations thereof in concentrations which produce undesirable aquatic life."

There is specific criteria for Class C waters. It is:

"Same as Water Supply -4- Plus ammonia nitrogen concentrations shall not exceed 1.4 mg/l in trout streams nor exceed 3.5 mg/l in warm water streams where the pH in these streams does not exceed a pH value of 8.3. If the pH of the streams exceeds 8.3, the undiasociated ammonium hudroxide as nitrogen shall not exceed one-tenth mg/l in trout streams nor exceed 0.25 mg/l in warm water streams ....."

Nevada (By Interstate Waters)

West Fork Carson River

Total Nitrates (NO_3) - mg/l

Single value-not more than 3.0.

Leviathan Creek

No criteria or statement.

East Fork Carson River

Total Nitrates (NO_3)-mg/l

Single value-not more than 2.0.

Carson River (At Muller Lane)

Total Nitrates (NO_3)

Single value-not more than 2.0.

Carson River (Highway 395, So. of Carson)

Total Nitrates (NO_3)-mg/l (Tentative)

Single value-not more than 2.0.

Carson River (Near New Empire)

Total Nitrates(NO_3)-mg/l (Tentative)

Single value-not more than 2.0.

Carson River (At Weeks)

Total Nitrates (NO_3)-mg/l

Single value-not more than 0.50.

Lake Lahontan

Total Nitrates(NO_3)-mg/l

Single value-not more than 4.0.

West Walker River (Above diversion to Topaz Lake)

Total Nitrates (NO_3)-mg/l

Single value-not more than 2.0.

Topaz Lake

Total Nitrates (NO_3)-mg/l

Single value-not more than 2.0.

West Walker River (Near Wellington)

Total Nitrates (NO_3)-mg/l

Single value-not more than 2.0.

West Walker River (Above confluent with East Walker River)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

Sweetwater Creek

Has approved antidegradation statement. Not to exceed PHS Drinking Water Standards 1962. *

East Walker River (At State Line)

Total Nitrates (NO_3)-mg/l

Single value-not more than 4.5.

East Walker River (South of Yerington and above confluent with W. Walker River.)

Nevada
(Cont'd)

Total Nitrates (NO_3)-mg/l

Single value-not more than 3.0.

Walker River (At J.J. Ranch)

Total Nitrates (NO_3)-mg/l

Not to exceed PHS Drinking Water Standards 1962.*

Desert Creek

Antidegradation statement approved. Not to exceed PHS Drinking Water Standards 1962.*

Chiatovich Creek

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

Indian Creek

Total Nitrates (NO_3)-mg/l

Antidegradation statement. Not to exceed 1962 PHS Drinking Water Standards.*

Leidy Creek (Above Hydoelectric Plant)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

Virgin River

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

Beaver Dam Wish (Above Schroeder Reservoir)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

Snake Creek(Above Fish Hatchery)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

Nevada
(Cont'd)

Big Goose Creek (At Ranch)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

Salmon Falls Creek (Highway 93, South of Jackpot

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0

Shosphone Creek

Approved antidegradation statement. Not to exceed PHS Drinking Water Standards 1962. *

East Frok, Jarbidge River

Approved antidegradation statement. Not to exceed 1962 PHS Drinking Water Standards.

Jarbidge River (Upstream from Jarbidge)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

Jarbidge River (Downstream of Jarbidge)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

West Fort Bruneau (Diamond "E" Road)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

East Fork Owyhee River (Above Mill Creek)

Approved antidegradation statement. Not to exceed the 1962 PHS Drinking Water Standards. *

Nevada
(Cont'd)

East Fork Owyhee River (South of Owyhee)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

East Fork Owyhee River (State Line)

Total Nitrates (NO_3)-mg/l

Single value-not more than 1.0.

South Fork Owyhee River

Total Nitrates (NO_3)-mg/l

Single value-not more than 3.0.

Smoke Creek (Approx. 30 mi. East of Susanville, California)

Total Nitrates (NO_3)-mg/l

Single value-not more than 5.0.

Bronco Creek (At Hirschdale Road)

Approved antidegradation statement. Not to exceed 1962 PHS Drinking Water Standards. *

Gray Creek (At Hirschdale Creek)

Approved antidegradation statement. Not to exceed 1962 PHS Drinking Water Standards. *

Truckee River (At Farad, California)

Total Nitrates (NO_3)-mg/l

Single value-not more than 2.5. Annual average not more than 1.0.

Truckee River (At Idlewild)

Total Nitrates (NO_3)-mg/l

Single value-not more than 2.0.

Truckee River (At Boynton Lane)

Nevada (Cont'd)	Total Nitrates (NO_3)-mg/l Single value-not more than 2.0. Truckee River (Lagomansine Bridge) Total Nitrates (NO_3)-mg/l Single value-not more than 5.0. Truckee River (At Cenrsola Ranch) Total Nitrates (NO_3)-mg/l Single value-not more than 5.0 Lake Tahoe (All points) Total soluable inorganic Nitrogen ug/l. Annual average-not more than 25.0. Colorado River No specific criteria. * ".....10 mg nitrate nitrogen (or 45 mg nitrate) per liter of water is a limit which should not be exceeded."
New Hampshire	No specific criteria. No applicable narrative statement. Have approved antidegradation statement.
New Jersey	The narrative statement limiting toxic or Deleterious Substances states the following: "Toxic or Deleterious Substances Including But Not Limited To Mineral Acids, Caustic Alkali, Cyanides, Heavy Metals, Carbon Dioxide, Ammonia or Ammonium Compounds, Chlorine, Phenols, Pesticides, Etc.: None, either alone or in combination with other substances, in such concentrations as to affect humans or be detrimental to the natural aquatic biota or which would render the waters unsuitable for the designated uses. None which would cause the Potable Water Standards of the Department for drinking water to be exceeded after appropriate treatment."

New Mexico

The following narrative statement under the heading of "General Standards" seems to offer a vehicle to use in limiting nitrates and other nutrients:

"Toxic Substances

Toxic substances such as, but not limited to, pesticides, herbicides, heavy metals, and organics, shall not be present in receiving waters in concentrations which will change the ecology of receiving waters to an extent detrimental to existing forms of life or which are toxic to human, plant, fish and animal life. Toxcities of substances in receiving waters will be determined by appropriate bio-assay techniques, or other acceptable means, for the particular form of aquatic life which is to be preserved with the concentrations of the toxic materials not to exceed 10 percent of the 48-hour median tolerance limit."

New York

New York does not have specific criteria limiting the amount of nitrates in interstate waters. It does have a toxic substance statement for each class of waters which is the same or similar to the following example: Class AA (Public Water Supply): "None alone or in combination with other substances or wastes in sufficient amounts or at such temperatures as to be injurious to fish life, make the waters unsafe or unsuitable as a source of water supply for drinking, culinary or food processing purposes or impair the waters for any other best usuage as determined for the specific waters which are assigned to this class."

North Carolina

North Carolina does not have specific numerical criteria to protect its interstate waters from nitrates. It does have an approved antidegradation statement that could be used to limit nitrates in existing high quality waters.

Section II (Rules Applicable To Classes and Standards) contains several narrative statements that could be used to limit nitrates where damage is occuring as a result of their discharge to interstate waters. These are:

1. "The quality of any waters receiving sewage, industrial waste or other waste discharges shall be such that no impairment of the best usuage of waters in any other class shall occur by reason of such sewage, industrial waste or other waste discharges."

2. "The maximum limits for toxic and other deleterious substances in receiving waters shall not exceed the values

North Carolina (Cont'd)

recommended in the most recent edition of the "Report of the National Technical Advisory Committee on Water Quality Criteria" where stated and in cases where such values are not included in the report, bio-assays will be conducted according to the standard techniques recommended therein to determine safe levels for such substances on the basis of the discharge and characteristics of the waters under consideration."

There are narrative statements for each class of water use that could possibly be used to limit harmful amounts of nitrates. These are:

Class A-I: In determining the safety or suitability of waters in this class for use as a source of water supply for drinking, culinary or food-processing purposes after approved disinfection, the Board will be guided by the physical, chemical and bacteriological standards specified in the 1962 edition of the "Public Health Service Drinking Water Standards" and the requirements of the State Board of Health as set forth in Section 5, "Protection of Unfiltered Public Water Supplies", of the Rules and Regulations Providing for the Protection of Public Water Supplies, as adopted October 6, 1960, and amended May 9, 1962, August 26, 1965, and October 12, 1967." The 1962 "Public Health Service Drinking Water Standards" recommend that nitrates shall not exceed 45 mg/l.

Class A-II: "Only such amounts, whether alone or in combination with other substances or wastes as will not render the waters unsafe or unsuitable as a source of water supply for drinking, culinary or food processing purposes, injurious to fish and wildlife or adversely affect the palatability of same, or impair the waters for any other best usuage established for this class."

Class B: "Only such amounts, whether alone or in combination with other substances or wastes as will not render the waters unsafe or unsuitable for bathing, injurious to fish and wildlife or adversely affect the palatability of same or impair the waters for any other best usuage established for this class."

Class C: "Only such amounts, whether alone or in combination with other substances or wastes as will not render the waters injurious to fish and wildlife or adversely affect the palatability or same, or impair the waters for any other best usage established for this class."

Class D: "Only such amounts attributable to sewage, industrial wastes or other wastes as will not render the waters unsuitable for agriculture, industrial cooling purposes, navigation, or fish survival, or cause offensive conditions."

Class SA Waters: Only such amounts, whether alone or in

North Carolina (Cont'd)	combination with other substances or wastes as will not make the waters unsafe or unsuitable for fish and shellfish or their propagation, impair the palatability of same, or impair the waters for any other best usage established for this class." Class SB: "Only such amounts, whether alone or in combination with other substances or wastes as will not make the waters unsafe or unsuitable for bathing, injurious to fish or shellfish, or adversely affect the palatability of same, or impair the waters for any other best usage established for this class." Class SC: "Only such amounts, whether alone or in combination with other substances or wastes as will not render the waters injurious to fish and shellfish, adversely affect the palatability of same, or impair the waters for any other best usage established for this class."
North Dakota	No specific criteria. Section II, C promises such criteria as follows: "C. The maximum practical reduction of nutrients, including nitrogen, phosphorus and sugars, in sewage, industrial, and other wastes shall be accomplished as soon as a practical method is developed." North Dakota has an approved antidegradation statement that should provide protection to existing high quality interstate waters from harmful amounts of nitrates. A narrative statement could be used on nutrient problems including nitrates. It is: "None in concentrations or combinations that interfere with, or prove hazardous to, the intended water usage." This applies to all interstate waters.
Ohio	Ohio has two narrative statements in their standards that could be applicable in limiting nitrates to less than harmful or nuisance amounts. These are: "1. Free from substances attributable to municipal, industrial or other discharges in concentrations or combinations which are toxic or harmful to human, animal or aquatic life." "2. Free from materials attributable to municipal, industrial, or other discharges producing color, odor or other conditions

Ohio (Cont'd)	in such degree as to create a nuisance;" Ohio has approved antidegradation statement that could be used to protect high quality waters.
Oklahoma	No specific criteria limiting nitrogen compounds. Have an approved antidegradation statement which could be used to limit harmful amounts of nitrogen compounds being discharged to interstate waters. The standards for each of the interstate streams in Oklahoma contain four narrative statements that could be used to limit harmful amounts of nitrogen compounds being discharged into interstate waters. These are: "All tributary streams and all waste effluents shall be in such condition that when discharged to the stream reaches as defined, and Interstate Tributaries, they shall not create conditions which will adversely affect public health, or use of the water for beneficial purposes." "Taste and Odor Producing Substances - Taste and odor producing substances shall be limited to concentrations that will not interfere with the production of potable water by modern treatment methods or impart off color or unpalatable flavor to flesh of fish, or result in offensive odors in the vicinity of the water, or otherwise interfere with beneficial uses." "Toxic Substances - Toxic substances shall not be present in such quantities as to cause the waters to be toxic to human, animal, plant, or aquatic life. For aquatic life, using bioassay techniques, the toxic limit shall not exceed one-tenth of the 48-hour median tolerance limit, except that other limiting concentrations may be used in specific cases when justified on the basis of available evidence and approved by the regulatory authority." "Other Substances - The control of other substances not heretofore mentioned will be guided by the U.S. Public Health Service Drinking Water Standards of 1962, or latest revision thereof, and accumulated scientific data on limits above which injury to use occurs. Pollutional substances will be maintained below maximum permissible concentrations for public water supplies, recreation requirements, agricultural needs and other beneficial uses.(c)*"
Oregon	Oregon has no specific criteria limiting nitrates. They do have an approved antidegradation statement to protect existing high quality interstate waters from damaging amounts of

Oregon (Cont'd)	nitrates. They have included two narrative statements in their general standards for interstate waters that could be used to limit the amount of nitrates in such waters should problems arise. These are: "No wastes shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in any waters of the State: (4) The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life or which are injurious to health, recreation or industry. (5) The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish."
Pennsylvania	Pennsylvania water quality standards do not contain specific criteria for nitrates. Nor does this State have an approved antidegradation statement to protect existing high quality water from harmful amounts of nitrates. The narrative statement contained under Section 4, General Criteria could be used to limit nitrates in interstate waters where problems from such nutrients occur. The statement is: "The water shall not contain substances attributable to municipal, industrial or other waste discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life. Specific substances to be controlled include, but are not limited to, floating debris, oil, scum and other floating materials; toxic substances; substances that produce color, tastes, odors or settle to form sludge deposits."
Rhode Island	No specific criteria to limit nitrates. Approved antidegradation statement that could be used to protect existing high quality waters from harmful amounts of nitrates. The water quality standards assigned the freshwater classification of Class A, B, C, and D each include the following narrative statement that could be used in limiting the amount of nitrates being discharged into interstate waters having nutrient problems: "Waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life for the appropriate, most sensitive and governing water class use. In areas where fisheries are the governing considerations and approved limits have not been established, bio-assays shall be performed as required by the appropriate agencies. For public drinking water

Rhode Island (Cont'd)

supplies the limits prescribed by the United States Public Health Service may be used where not superseded by more stringent signatory State requirements."

The water quality standards assigned to saltwater classifications SA, SB, SC, and SD have the following narrative statement that could be used to limit where problems arise: "None in concentrations or combinations which would be harmful to human, animal, or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the waters for any other uses."

South Carolina

No specific criteria limiting the nitrate content of interstate waters. They have an approved antidegradation statement that could be used to protect existing high quality waters from harmful amounts of nitrate. They also have the following narrative statements that could be applicable in limiting nitrates in problem areas:

"Source of water supply for drinking, culinary or food processing purposes shall mean any source, either public or private the waters from which are used for domestic consumption, or used in connection with the processing of milk, beverages, food or for other purposes which require finished water meeting U.S. Public Health Service Drinking Water Standards."

"The waters of the State shall be free from: Materials attributable to sewage, industrial waste, or other waste which produce taste, odor, or change the existing color or other physical and chemical conditions in the receiving stream to such degree as to create a nuisance, or that interfere directly or indirectly with water uses; and high-temperature, toxic, corrosive or other deleterious substances attributable to sewage, industrial waste, or other waste in concentrations or combinations which interfere directly or indirectly with water uses, or which are harmful to human, animal, plant or aquatic life."

Class SA water quality standards contains the following narrative statement that could be used to limit nitrates where problems exist: "Toxic wastes, deleterious substances, colored or other wastes. None alone or in combination with other substances or wastes in sufficient amounts as to be injurious to edible fish or shellfish or the culture or propagation thereof, or which in any manner shall adversely affect the flavor, color, odor, or sanitary condition thereof or

South Carolina (Cont'd)

or impair the waters for any other best usage as determined for the specific waters which are assigned to this class."

South Dakota

The following narrative statement could be used to limit nitrates for all classes of water other than Domestic Water Supply and Recreation which have specific criteria:

"Toxic Materials. No materials shall be discharged to any surface water or watercourse in the State which produce concentrations of chemicals toxic to humans, animals or the most sensitive stage or form of aquatic life greater than 0.1 times the 96-hour median tolerance limit for short residual compounds or 0.01 times the median tolerance limit for accumulative substances or substances exhibiting a residual life exceeding 30 days in the receiving waters."

"Median tolerance concentrations shall be based on the results of the most recent research results for the material being studied or, in case of disagreement, by bioassay tests simulating actual stream conditions run in accordance with procedures outlined in latest edition of 'Standard Methods for the Examination of Water and Wastewater' published by the American Public Health Association and using test animals or organisms specified by the Committee."

"Concentrations specified for toxic materials shall be based on daily averages, but the concentrations shall not exceed 125% of the value specified at any time or in any section of the receiving water."

Waters classed for Domestic Water Supply and Recreation have the following specific criteria limiting nitrates:

Domestic Water Supply

Nitrates not more than 10 mg/l(as N) or 45 mg/l as (NO_3)

Recreation

Nitrates as (NO_3) not more than 50 mg/l

Have approved antidegradation statement that could be used to limit nitrates causing problems in existing high quality waters.

Tennessee

Does not have an antidegradation statement to protect existing high quality waters from harmful amounts of nitrates. There are no specific criteria limiting the amount of nitrates in interstate waters.

The following narrative statements under use classifications could be used to restrict nitrates in problem areas:

"Domestic Raw Water Supply

K. Other Pollutants - other pollutants shall not be added

Tennessee (Cont'd)	to the water in quantities that may be detrimental to public health or impairs the usefulness of the water as a source of domestic water supply." "Industrial Supply Other Pollutants - Other pollutants shall not be added to the waters in quantities that may adversely affect the water for industrial processing." "Fish and Aquatic Life H. Other Pollutants - other pollutants shall not be added to the waters that will be detrimental to fish or aquatic life." "Recreation I. Other Pollutants - other pollutants shall not be added to the water in quantities which may have a detrimental effect on recreation."
Texas	No specific criteria. A narrative statement that could be used to protect waters from excessive nitrate concentrations is: "Taste and odor producing substances shall be limited to concentrations in the waters of the state that will not interfere with the production of potable water by reasonable water treatment methods, or impair unpotable flavor to food fish, including shellfish, or result in offensive odors rising from the waters or otherwise interfere with the reasonable use of the waters." Approved antidegradation statement.
Utah	No specific criteria. Narrative statements: Class A "It shall be unlawful to discharge or place any wastes or other substances in such a way as to interfere with the stated Class "A" Water uses,. . ." Class B "It shall be unlawful to discharge or place any wastes or other substances in such a way as to interfere with the stated Class "B" water uses, ..." Class C "It shall be unlawful to discharge or place any wastes or other substances in such a way as to interfere with the stated Class "C" water uses, ..." Have approved antidegradation statement.

Vermont

Have an approved antidegradation statement to protect existing high quality water from harmful amounts of nitrates.

Rules 8 and 9 of the Vermont water quality standards concerning discharge requirements for Class A and B waters limit the discharge of nutrients including nitrates as follows:

"RULE 8: Discharges Prohibited - Class A Waters

In accordance with the antidegradation provisions of Rule 2 there shall be no discharge of wastes into Class A waters that does not meet or exceed the technical and other requirements for such waters nor shall there be any new discharges of wastes containing any form of nutrients which would encourage eutrophication or growth of weeds or algae from the date of the adoption of this rule.

RULE 9: Discharges Restricted - Class B Lakes and Ponds

In accordance with the anti-degradation provisions of Rule 2 there shall be no new discharge of wastes into any lake, pond or reservoir, natural or artificial, lying wholly within the state's boundaries, or into the tributaries thereto which does not meet the technical and other requirements for Class B waters nor shall there be any new discharge of wastes containing any form of nutrients which would encourage eutrophication or growth of weeds and algae from the date of adoption of this rule. Any existing waste discharge containing soluble or other nutrients, which would encourage eutrophication or growth of weed and algae, shall be treated so as to remove such nutrients to the extent that such removal is or may become technically and reasonably feasible."

The narrative statement, Rule 12 of the Vermont water quality standards, should be applicable to limit nitrates doing damage to interstate waters, according to the interpretation made in Martin L. Johnson's letter of July 27, 1971, to Mr. Klashman, Acting Regional Director of Region 1. Mr. Johnson is Commissioner of Water Resources for the State of Vermont. The statement and interpretation are as follows:

"RULE 12: Chemical, Radiological Constituents

Wastes shall be free of chemical and radiological constituents which would be harmful to the governing water class use. In areas where fisheries are the governing consideration and

Vermont (Cont'd)

approved limits have not been established, bio-assays shall be performed as required by the appropriate state agencies.

"The new regulations are very strict with regard to the discharge of chemical or radiological constituents. In interpreting the narrative criteria, we will not permit the concentrations of these constituents due to effluent discharges to exceed those numerical limits set forth in the Public Health Service Drinking Water Standard."

Public Health Drinking Water Standards limit nitrates to less than 45 mg/l.

Virginia

"1.05 In addition to other standards established for the protection of public or municipal water supplies, the following standards will apply at the raw water intake point:

Nitrates plus Nitrites 10 mg/l"

Has an approved antidegradation statement to protect existing high quality waters from harmful amounts of nitrates.

Have special standards applicable to specific waterstate waters and or as assigned that limit the amount of nutrients in effluents, including nitrates.

Have special standards limiting nutrients, including nitrates in specific interstate waters as assigned. They are:

"h. Objective for Nutrients - The cumulative total of nitrogen as N from all sources in the effluent shall not be greater than 0.5 mg/l at any time; phosphorus as P from all sources in the effluent shall not be greater than 1.0 mg/l+ at any time.

i. The State Water Control Board has directed and/or ordered the following:

1. That all existing discharges in accordance with h above shall substantially remove the nutrients in their effluents on or before such time as central facilities (The Hampton Roads Sanitation District Commission Chesapeake-Elizabeth System) become available or connect to central facilities, (i.e. The Chesapeake-Elizabeth System).

2. That it will consider approving small discharges to this watershed to facilitate the elimination of potential public health hazards provided central facilities (Chesapeake-

Virginia (Cont'd)

Elizabeth System) are not available, and

3. That it will not allow additional significant new discharges to this watershed, which do not provide for nutrient removal facilities in accordance with h above.

j. The following, from Minute 73 of the proceedings of the Board at its meeting on July 11-12, 1966, will also apply:

For discharge to the Chickahominy River and its tributaries below Bottoms Bridge, effluent quality obtainable with conventional secondary sewage treatment plants with approved plans is acceptable, except that the following specifications shall be met:

Constituent	Analysis Schedule	Concentration
2 Inorganic Nutrients	Once/week on a composite sample	Nitrate (as N) not to exceed .5 ppm. Total phosphate (as PO_4) not to exceed 1.5 ppm

In lieu of the above requirements, conventional secondary sewage treatment plants may ordinarily be used anywhere in the Chickahominy River Basin, provided holding ponds, capable of retaining the entire plant effluent during low flow critical conditions, are constructed. "Low flow" is construed to mean less than 15 cubic feet per second in the main stem of the Chickahominy River itself at the (1) point of waste discharge to the main stem, or (2) confluence of a tributary below the point of waste discharge to the tributary. Below Bottoms Bridge, holding ponds with at least 60-day retention capacity (August 14 to October 13) may be required, if in the opinion of the Board's staff it is deemed necessary.

k. The following from Minute 73 of the proceedings of the Board at its meeting on July 11-12, 1966, will also apply:

Constituent	Analysis Schedule	Concentration
5 Ammonia	Same as bio-chemical oxygen demand on specially preserved samples	Not to exceed 2.0 ppm as N
Inorganic Nutrients	Once/week on a composite sample	Nitrate (as N) not to exceed .3 ppm, total phosphate (as PO_4) not to exceed .6 ppm (mean values in the Chickahominy)

Virginia (Cont'd)

In lieu of the above requirements, conventional secondary sewage treatment plants may ordinarily be used anywhere in the Chickahominy River Basin, provided holding ponds, capable of retaining the entire plant effluent during low flow critical conditions, are constructed. "Low flow" is construed to mean less than 15 cubic feet per second in the main stem of the Chickahominy River itself at the (1) point of waste discharge to the main stem, or (2) confluence of a tributary below the point of waste discharge to the tributary. Above Bottoms Bridge the holding ponds are to retain the entire plant effluent for at least 90 days (July 15 to October 13).

r. The following will also apply to the Occoquan Creek Watershed:

(1) It was willing to permit the discharge of treated sewage effluent from an additional 25,000 persons with the stipulation that:

(a) nutrient removal facilities be constructed in each case.

s. The following, from Minute 20 of the proceedings of the Board at its meeting on January 16, 1969, will also apply to the Powhatan Creek Watershed:

1. All proposals for treated waste discharges to the Powhatan Creek Watershed will in the future be approved only after:

(a) Engineering data has been submitted indicating the capability of the proposed treatment facilities to remove all phosphorus and nitrogen compounds.

(b) Owners with facilities existing at the time of this action will, in a period not to exceed 60 days, submit to the Board, engineering reports and pollution abatement schedules indicating the maximum concentrations of phosphorus and nitrogen compounds which they can remove from waste waters prior to discharge. No schedule providing a time period exceeding three years will be approved. Modification or replacement of existing treatment facilities may be necessary.

2. It will entertain from owners in the area a proposal for development of:

Virginia (Cont'd)	(a) A central facility to treat all wastes at a point outside the Watershed, where phosphorus and nitrogen removal will probably not be necessary, or (b) Treatment facilities inside the Watershed which include complete removal of all phosphorus and nitrogen compounds."
Washington	Have an approved antidegradation statement that could be used to limit nitrates in existing high quality waters. The Toxic, Radioactive or Deleterious Material Concentrations and the Aesthetic Values statements for each water use classification could possibly be used to limit the amount of nitrates in interstate waters. They are: "Class AA Toxic, Radioactive or Deleterious Material Concentrations shall be less than those which may affect public health, the natural aquatic environment, or the desirability of the water for any usage. Aesthetic Values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch or taste." "Class A "Toxic, Radioactive or Deleterious Material Concentrations shall be below those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect any water use. Aesthetic Values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch or taste." "Class B "Toxic, Radioactive or Deleterious Material Concentrations shall be below those which adversely affect public health during the exercise of characteristic usages, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect characteristic water uses. Aesthetic Values shall not be reduced by dissolved, suspended, floating or submerged matter, not attributable to natural causes, so as to affect water usage or paint the flesh of edible species." "Class C

"Toxic, Radioactive or Deleterious Material Concentrations shall be below those which adversely affect public health during the exercise of characteristic usages, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect characteristic water uses.

Aesthetic Values shall not be interfered with by the presence of obnoxious wastes, slimes, or aquatic growths or by materials that will taint the flesh of edible species."

West Virginia

All of the interstate waters of West Virginia are assigned criteria which limits nitrates to (NO_3) to less than 45 mg/l. Have approved antidegradation statement that could be used to limit nitrates causing trouble in existing high quality waters.

Wisconsin

Have an approved antidegradation statement that could be used to limit nitrates causing problems in existing high quality waters.

These are several narrative statements that could be used to limit problems causing nitrates. These are:

1. "Minimum Standards. Regardless of the water quality standards and water use, untreated or inadequately treated wastes may not impair a designated use nor may standards be interpreted to permit a lower quality within a water sector than that existing or required by outstanding orders..."

2. "Substances in concentrations or combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts, which by bio-assay and other appropriate tests, indicate acute or chronic levels harmful to animal, plant or aquatic life."

The only specific criteria is provided by a statement applying to interstate waters used for public water supplies. That is:

"(d) The intake water supply will be such that by appropriate treatment and adequate safeguards it will meet the Public Health Service Drinking Water Standards, 1962..."

Public Health Service Drinking Water Standards state that nitrate as (NO_3) should not exceed 45 mg/l.

Wyoming	Have no specific criteria limiting nitrates in interstate waters. Have no approved antidegradation statement that could be used to limit nitrates causing problems in existing high quality waters. No narrative statement that could be used to limit nitrates in interstate waters where such substances are causing problems.
District of Columbia	Have no approved antidegradation statement that could be used to limit nitrates causing problems in existing high quality waters. They have no specific criteria limiting nitrates in interstate waters. The following narrative statement from the District of Columbia water quality standards could be used to limit nitrates where problems attributable to them exist in the interstate waters: "Materials attributable to sewage, industrial waste, or other waste which produce taste, odor or appreciably change the existing color or other physical and chemical conditions in the receiving streams to such degree as to create a nuisance, or that interfere directly or indirectly with water uses..."
Guam	Have an approved antidegradation statement that could be used to limit nitrates causing problems in existing high quality waters. The two following freedom statements could be used to limit nitrates causing problems in interstate waters: "Free from substances and conditions or combinations thereof attributable to sewage, industrial wastes, or other wastes that will induce undesirable aquatic life. Free from substances and conditions thereof attributable to sewage, industrial wastes, or other wastes toxic or irritant to humans, animals, plants, and aquatic life." Waters classed as Domestic Water Supply have both specific criteria and a narrative statement. They are: "Treated surface waters used for public or domestic water supply shall meet the recommendations of the Public Health Service Drinking Water Standards." They recommend not more than 45 mg/l as (NO_3).

Guam (Cont'd)

"Ammonia nitrogen shall be less than .01 mg/l as N."
Waters classed for the Propagation of Fish and Other Aquatic Life limit nutrients such as nitrates as follows:

"The naturally occurring ratio and concentrations of nitrogen and phosphorus will be maintained in near shore waters and fresh waters."

Puerto Rico

The water quality standards of Puerto Rico have no specific criteria limiting nitrates in interstate waters.

Have an approved antidegradation statement that could be used to restrict the amount of nitrates causing problems in existing high quality waters.

Contains a narrative statement that could be used to limit nitrates in interstate waters where problems arising from them exist. It is:

"1. Class SA

Existing natural conditions shall not be altered."

"2. Class SB

e. Toxic wates or deleterious substances alone or in combination with other substances or wastes in sufficient amounts ..... which in any way obviously affect the flavor, color, odor, or sanitary conditions of the waters...."

Virgin Islands

Have no specific criteria to limit nitrates in interstate water.

Have no narrative statement that could be used to limit nitrates in problem areas.

Have an approved antidegradation statement that could be used to limit nitreates causing problems for existing high quality waters.